

SEQUENCE LISTING

<110> Wang

<120> Cloning and Characterization of the Broad-Spectrum Resistance Gene Pi2

<130> 035718/268948

<150> 60/455,713
<151> 2003-03-18

<150> 60/409,216
<151> 2002-09-09

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<170> FastSEQ for Windows Version 4.0

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<213> Oryza minu
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gcc gtc ggg aag gcc gcc tcc gcc gcc gac gag gcc acc ctc ctg
Ala Val Gly Lys Ala Ala Ser Ala Ala Asp Glu Ala Thr Leu Leu
    20          25          30          35

ctc ggc atc cag aag gag atc tgg tac atc aag gac gag ctg aaa act
Leu Gly Ile Gln Lys Glu Ile Trp Tyr Ile Lys Asp Glu Leu Lys Thr
    35          40          45          50

att cag gca ttc tta aga gct gct gaa gta aca aag aag aaa gat gac
Ile Gln Ala Phe Leu Arg Ala Ala Glu Val Thr Lys Lys Asp Asp
    50          55          60          65

ttg cta aag gta tgg gca gag caa gta cga gat ctg tca tat aac att
Leu Leu Lys Val Trp Ala Glu Gln Val Arg Asp Leu Ser Tyr Asn Ile
    65          70          75          80

gaa gat tgc cta gac gaa ttc aag gtt cat gtt gag agc caa agc ttg
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    85          90          95          100

gca aag caa cta atg aag ctt ggt gaa cgc cat cga att gct gta cag
Ala Lys Gln Leu Met Lys Leu Gly Glu Arg His Arg Ile Ala Val Gln
    100         105         110         115

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Ile Arg Asn Leu Lys Ser Arg Ile Glu Glu Val Ser Asn Arg Asn Thr
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Arg Asp Ser Tyr Leu Glu Asp Ala Arg Asn Arg Ser Gly Ser Asn Thr	
145 150 155 160	
gac gag tca gaa ctt gtg ggc ttt gcc aag act aaa gat gag ttg ctt	528
Asp Glu Ser Glu Leu Val Gly Phe Ala Lys Thr Lys Asp Glu Leu Leu	
165 170 175	
aaa ctg ata gat gtc aat act aat gac ggt cca gct aaa gtg ata tgt	576
Lys Leu Ile Asp Val Asn Thr Asn Asp Gly Pro Ala Lys Val Ile Cys	
180 185 190	
gtg gtt ggt atg ggt gga tta ggc aag act acc ctt gca agg aag gca	624
Val Val Gly Met Gly Leu Gly Lys Thr Thr Leu Ala Arg Lys Ala	
195 200 205	
tat gaa aac aag gaa cac atg aag aac ttc tcg tgt tgt gct tgg atc	672
Tyr Glu Asn Lys Glu His Met Lys Asn Phe Ser Cys Cys Ala Trp Ile	
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act gtg tct cag tca ttt gac agg aaa gaa att ctg aaa caa atg atc	720
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agg caa ctt ctg ggt gct gat tca tta gac aaa ctc ttg aaa gaa ttt	768
Arg Gln Leu Leu Gly Ala Asp Ser Leu Asp Lys Leu Leu Lys Glu Phe	
245 250 255	
agt gag aag ttg ctc gtg caa gtc cag cat ctc gct gat cac ttg gtt	816
Ser Glu Lys Leu Leu Val Gln Val Gln His Leu Ala Asp His Leu Val	
260 265 270	
gaa ggg cta aag gag aaa agg tac ttt gtt gtc ctt gat gac cta tgg	864
Glu Gly Leu Lys Glu Lys Arg Tyr Phe Val Val Leu Asp Asp Leu Trp	
275 280 285	
acc ata gat gca tgg aat tgg att cat gat att gct ttt ccg aag att	912
Thr Ile Asp Ala Trp Asn Trp Ile His Asp Ile Ala Phe Pro Lys Ile	
290 295 300	
aac aac aga ggt agt cgc ata ata ata aca acg cga gat gct ggc tta	960
Asn Asn Arg Gly Ser Arg Ile Ile Ile Thr Thr Arg Asp Ala Gly Leu	
305 310 315 320	
gct gga agg tgt acc tct gaa tca ctt att tac cac ctt gaa ccg tta	1008
Ala Gly Arg Cys Thr Ser Glu Ser Leu Ile Tyr His Leu Glu Pro Leu	
325 330 335	
cat ata gat gat gct ata cac ttg cta cta gca aag aca aac ata aga	1056
His Ile Asp Asp Ala Ile His Leu Leu Ala Lys Thr Asn Ile Arg	
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660	665	670		
ccc aag gaa tgc ttg atg atc acc atg tgc tta ccg atg gtt ttc tta Pro Lys Glu Cys Leu Met Ile Thr Met Cys Leu Pro Met Val Phe Leu				2064
675	680	685		
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690	695	700		
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705	710	715	720	
aga gga att gac aac cta aaa gag tta cag att cta gaa gtc gtg gac Arg Gly Ile Asp Asn Leu Lys Glu Leu Gln Ile Leu Glu Val Val Asp				2208
725	730	735		
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740	745	750		
cag tta aga aaa tta agc gtg aca aca aaa ggc gcc aca aat aag aag Gln Leu Arg Lys Leu Ser Val Thr Thr Lys Gly Ala Thr Asn Lys Lys				2304
755	760	765		
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770	775	780		
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785	790	795	800	
ctc aat tcg att gca tgt cct cca ttc ttg aag aga ctc aag ttg Leu Asn Ser Ile Ala Cys Pro Pro Phe Leu Lys Arg Leu Lys Leu				2448
805	810	815		
aat gga tct ctt gca gat aca cca aac tgg ttt ggg aac ctt aag cag Asn Gly Ser Leu Ala Asp Thr Pro Asn Trp Phe Gly Asn Leu Lys Gln				2496
820	825	830		
ctg gtg aag atg tgc tta tcc aga tgt ggg cta aaa gat ggt aaa act Leu Val Lys Met Cys Leu Ser Arg Cys Gly Leu Lys Asp Gly Lys Thr				2544
835	840	845		
atg gag ata ctt ggg gca ctg ccc aac ctt atg gtt ctt cgt ctt tat Met Glu Ile Leu Gly Ala Leu Pro Asn Leu Met Val Leu Arg Leu Tyr				2592
850	855	860		
cgc aac gca tat gct gac gag aaa atg aca ttc aga agg gga act ttc Arg Asn Ala Tyr Ala Asp Glu Lys Met Thr Phe Arg Arg Gly Thr Phe				2640
865	870	875	880	
cca aat ctc agg tgt ctt gat att tac ttg ctg aag caa ctt aga gag				2688

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Tyr Gly Cys Arg Leu Glu Ser Gly Ile Ile Gly Ile Lys His Leu Pro			
915	920	925	
aga ctt aag att att tcg ctt gaa tat gat ggt aaa gtc gcg aag ctt		2832	
Arg Leu Lys Ile Ile Ser Leu Glu Tyr Asp Gly Lys Val Ala Lys Leu			
930	935	940	
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Asp Val Leu Gln Glu Val Asn Thr His Pro Asn His Thr Glu Leu			
945	950	955	960
caa atg gca gag gat cga agt cat cat gac cta gga ggc ctt gca tct		2928	
Gln Met Ala Glu Asp Arg Ser His His Asp Leu Gly Gly Leu Ala Ser			
965	970	975	
gat ggc gat gat gcc cat gac aat cca gcg ttg cgc tat caa aca tca		2976	
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tgt tga		2982	
Cys *			

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Ile Gln Ala Phe Leu Arg Ala Ala Glu Val Thr Lys Lys Asp Asp		
50 55 60		
Leu Leu Lys Val Trp Ala Glu Gln Val Arg Asp Leu Ser Tyr Asn Ile		
65 70 75 80		
Glu Asp Cys Leu Asp Glu Phe Lys Val His Val Glu Ser Gln Ser Leu		
85 90 95		
Ala Lys Gln Leu Met Lys Leu Gly Glu Arg His Arg Ile Ala Val Gln		
100 105 110		
Ile Arg Asn Leu Lys Ser Arg Ile Glu Glu Val Ser Asn Arg Asn Thr		
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Arg Tyr Ser Leu Ile Lys Pro Ile Ser Ser Ile Thr Thr Glu Asp Glu		
130 135 140		
Arg Asp Ser Tyr Leu Glu Asp Ala Arg Asn Arg Ser Gly Ser Asn Thr		
145 150 155 160		
Asp Glu Ser Glu Leu Val Gly Phe Ala Lys Thr Lys Asp Glu Leu Leu		
165 170 175		
Lys Leu Ile Asp Val Asn Thr Asn Asp Gly Pro Ala Lys Val Ile Cys		
180 185 190		
Val Val Gly Met Gly Gly Leu Gly Lys Thr Thr Leu Ala Arg Lys Ala		

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Ser Glu Lys Leu Leu Val Gln Val Gln His Leu Ala Asp His Leu Val		
260	265	270
Glu Gly Leu Lys Glu Lys Arg Tyr Phe Val Val Leu Asp Asp Leu Trp		
275	280	285
Thr Ile Asp Ala Trp Asn Trp Ile His Asp Ile Ala Phe Pro Lys Ile		
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Ala Gly Arg Cys Thr Ser Glu Ser Leu Ile Tyr His Leu Glu Pro Leu		
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His Ile Asp Asp Ala Ile His Leu Leu Ala Lys Thr Asn Ile Arg		
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Leu Glu Asp Met Glu Asn Asp Glu Asp Leu Gly Ser Ile Val Thr Lys		
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Leu Val Lys Arg Cys Gly Tyr Leu Pro Leu Ala Ile Leu Thr Ile Gly		
370	375	380
Gly Ile Leu Ala Thr Lys Lys Ile Met Glu Trp Gly Lys Phe Tyr Arg		
385	390	395
Glu Leu Pro Ser Glu Leu Glu Ser Asn Pro Ser Leu Glu Ala Met Arg		
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Arg Met Val Thr Leu Ser Tyr Asn His Leu Pro Ser His Leu Lys Pro		
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Cys Phe Leu Tyr Leu Ser Ile Phe Pro Glu Asp Phe Glu Ile Gln Arg		
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Gly Arg Leu Val Asp Arg Trp Ile Ala Glu Gly Phe Val Arg Ala Thr		
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Asp Gly Val Asn Ile Glu Asp Val Gly Asn Ser His Phe Asn Glu Leu		
465	470	475
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Val Lys Arg Cys Arg Ile His Asp Ile Met Arg Asp Ile Ile Val Ser		
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515	520	525
Val Val Ala Glu Glu Ser Ile Arg His Leu Ala Phe His Gly Ser Lys		
530	535	540
Cys Ser Lys Ile Cys Leu Glu Trp Asn His Leu Arg Ser Val Thr Leu		
545	550	555
Phe Gly Asp Arg Pro Val Gly Arg Thr Pro Ala Leu Cys Ser Pro Gln		
565	570	575
Phe Arg Met Leu Arg Val Leu Asp Leu Glu Asp Ala Lys Phe Lys Phe		
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Gly Lys Leu Gln Cys Leu Gln Ile Leu Asn Met Arg Glu Ala Asn Ile		
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Ser Ala Leu Thr Thr Glu Val Thr Lys Leu Gln Asn Leu Arg Ser Leu		
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Arg Cys Ser Arg Arg Ser Gly Ser Gly Tyr Phe Ser Ile Ile Asp Asn		
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Pro Lys Glu Cys Leu Met Ile Thr Met Cys Leu Pro Met Val Phe Leu		
675	680	685
Thr Ser Ile Asn Phe Ser Asp Arg Val Lys Leu Ile Pro Glu Ile Cys		
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 725 730 735
 Ile Asn Arg Thr Ser Arg Lys Ala Ile Glu Glu Leu Gly Glu Leu Ile
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 Gln Leu Arg Lys Leu Ser Val Thr Thr Lys Gly Ala Thr Asn Lys Lys
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 Tyr Gln Ile Phe Cys Ala Ala Ile Glu Lys Leu Ser Ser Leu Gln Ser
 770 775 780
 Leu Arg Val Asp Ala Glu Gly Phe Ser Asp Thr Gly Thr Leu Glu Trp
 785 790 795 800
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 Asn Gly Ser Leu Ala Asp Thr Pro Asn Trp Phe Gly Asn Leu Lys Gln
 820 825 830
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 835 840 845
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 850 855 860
 Arg Asn Ala Tyr Ala Asp Glu Lys Met Thr Phe Arg Arg Gly Thr Phe
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 Pro Asn Leu Arg Cys Leu Asp Ile Tyr Leu Leu Lys Gln Leu Arg Glu
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 Ile Arg Phe Glu Glu Gly Thr Ser Pro Thr Met Glu Ser Ile Glu Ile
 900 905 910
 Tyr Gly Cys Arg Leu Glu Ser Gly Ile Ile Gly Ile Lys His Leu Pro
 915 920 925
 Arg Leu Lys Ile Ile Ser Leu Glu Tyr Asp Gly Lys Val Ala Lys Leu
 930 935 940
 Asp Val Leu Gln Glu Glu Val Asn Thr His Pro Asn His Thr Glu Leu
 945 950 955 960
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 Ile Ser Lys Ala Ala Ser Ala Ala Asn Glu Thr Ser Leu Leu Leu
 20 25 30

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 Gly Val Glu Lys Asp Ile Trp Tyr Ile Lys Asp Glu Leu Lys Thr Met
 35 40 45

cag gca ttc ctt aga gct gct gaa gtt atg aaa aag aaa gat gaa cta 192

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Leu Lys Val Trp Ala Glu Gln Ile Arg Asp Leu Ser Tyr Asp Ile Glu			
65	70	75	80
gat tcc ctt gat gaa ttt aaa gtc cat att gaa agc caa acc cta ttt			288
Asp Ser Leu Asp Glu Phe Lys Val His Ile Glu Ser Gln Thr Leu Phe			
85	90	95	
cgt cag ttg gtg aaa ctt aga gag cgc cac cg ^g atc gct atc cgt atc			336
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100	105	110	
cac aac ctc aaa tca aga gtt gaa gaa gtg agt agc agg aac aca cgc			384
His Asn Leu Lys Ser Arg Val Glu Glu Val Ser Ser Arg Asn Thr Arg			
115	120	125	
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Tyr Asn Leu Val Glu Pro Ile Ser Ser Gly Thr Glu Asp Asp Met Asp			
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Ser Tyr Ala Glu Asp Ile Arg Asn Gln Ser Ala Arg Asn Val Asp Glu			
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gct gag ctt gtt ggg ttt tct gac tcc aag aaa agg ctg ctt gaa atg			528
Ala Glu Leu Val Gly Phe Ser Asp Ser Lys Lys Arg Leu Leu Glu Met			
165	170	175	
atc gat acc aat gct aat gat ggt ccg gcc aag gta atc tgt gtt gtt			576
Ile Asp Thr Asn Ala Asn Asp Gly Pro Ala Lys Val Ile Cys Val Val			
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Ser Glu Glu Asp Ile Arg Lys Asn Phe Pro Cys Asn Ala Trp Ile Thr			
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Val Ser Gln Ser Phe His Arg Ile Glu Leu Leu Lys Asp Met Ile Arg			
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Gly Lys Val Val Gln Val His His Leu Ser Glu Tyr Leu Ile Glu			
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Glu Leu Lys Glu Lys Arg Tyr Phe Val Val Leu Asp Asp Leu Trp Ile			
275	280	285	
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Leu His Asp Trp Asn Trp Ile Asn Glu Ile Ala Phe Pro Lys Asn Asn			
290	295	300	

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aac cga agt atg att caa cga tca aga gtg ggc aca gca gga aaa att Asn Arg Ser Met Ile Gln Arg Ser Arg Val Gly Thr Ala Gly Lys Ile 485 490 495	1488
aag act tgt cga atc cat gat atc atc cgt gat atc aca gtt tca atc Lys Thr Cys Arg Ile His Asp Ile Ile Arg Asp Ile Thr Val Ser Ile 500 505 510	1536
tcg aga cag gaa aat ttt gta tta cca atg gga gat ggc tct gat Ser Arg Gln Glu Asn Phe Val Leu Leu Pro Met Gly Asp Gly Ser Asp 515 520 525	1584
tta gtt cag gaa aac act cgc cac ata gca ttc cat ggg agt atg tcc Leu Val Gln Glu Asn Thr Arg His Ile Ala Phe His Gly Ser Met Ser 530 535 540	1632
tgc aaa aca gga ttg gat tgg agc att att cga tca tta gct att ttt Cys Lys Thr Gly Leu Asp Trp Ser Ile Ile Arg Ser Leu Ala Ile Phe 545 550 555 560	1680

gtt gac aga ccc aag agt cta gca cat gca gtt tgt cca gat caa ttg Gly Asp Arg Pro Lys Ser Leu Ala His Ala Val Cys Pro Asp Gln Leu 565 570 575	1728
agg atg tta cggttc ttg gat ctt gaa gat gtg aca ttc tta atc act Arg Met Leu Arg Val Leu Asp Leu Glu Asp Val Thr Phe Leu Ile Thr 580 585 590	1776
caa aaa gat ttc gac cgt att gca ttg ttg tgc cac ttg aaa tac ttg Gln Lys Asp Phe Asp Arg Ilé Ala Leu Leu Cys His Leu Lys Tyr Leu 595 600 605	1824
agt att gga tat tcg tca tcc ata tat tca ctt ccc aga tcc att ggt Ser Ile Gly Tyr Ser Ser Ile Tyr Ser Leu Pro Arg Ser Ile Gly 610 615 620	1872
aaa cta cag ggc cta cag act ttg aac atg tca agc aca tac att gca Lys Leu Gln Gly Leu Gln Thr Leu Asn Met Ser Ser Thr Tyr Ile Ala 625 630 635 640	1920
gca cta cca agt gag atc agt aaa ctc caa tgt ctg cat act ctt cgt Ala Leu Pro Ser Glu Ile Ser Lys Leu Gln Cys Leu His Thr Leu Arg 645 650 655	1968
tgt ata aga gag ctt gaa ttt gac aac ttt agt cta aat cac cca atg Cys Ile Arg Glu Leu Glu Phe Asp Asn Phe Ser Leu Asn His Pro Met 660 665 670	2016
aag tgc ata act aac aca ata tgc ctg cct aaa gta ttc aca cct tta Lys Cys Ile Thr Asn Thr Ile Cys Leu Pro Lys Val Phe Thr Pro Leu 675 680 685	2064
gtt agt cgc gat aat cgt gca aaa caa att gct gaa ttt cac atg gcc Val Ser Arg Asp Asn Arg Ala Lys Gln Ile Ala Glu Phe His Met Ala 690 695 700	2112
acc aaa agt ttc tgg tct gaa tca ttc ggt gtg aag gta ccc aaa gga Thr Lys Ser Phe Trp Ser Glu Ser Phe Gly Val Lys Val Pro Lys Gly 705 710 715 720	2160
ata ggt aag ttg cga gac tta cag gtt cta gag tat gta gat atc agg Ile Gly Lys Leu Arg Asp Leu Gln Val Leu Glu Tyr Val Asp Ile Arg 725 730 735	2208
cgg acc agt agt aga gca atc aaa gag ctg ggg cag tta agc aag ttg Arg Thr Ser Ser Arg Ala Ile Lys Glu Leu Gly Gln Leu Ser Lys Leu 740 745 750	2256
agg aaa tta gct gtg ata aca aaa ggc tcg aca aag gaa aaa tgt aag Arg Lys Leu Ala Val Ile Thr Lys Gly Ser Thr Lys Glu Lys Cys Lys 755 760 765	2304
ata ctt tat gca gcc att gag aag ctc tct tcc ctc caa tct ctc tat Ile Leu Tyr Ala Ala Ile Glu Lys Leu Ser Ser Leu Gln Ser Leu Tyr 770 775 780	2352
atg aat gct gcg tta tta tca gat att gaa aca ctt gag tgc cta gat Met Asn Ala Ala Leu Leu Ser Asp Ile Glu Thr Leu Glu Cys Leu Asp 785 790 795 800	2400
tct att tca tct cct ccc cta ctg agg aca ctc ggg ttg aat gga Ser Ile Ser Ser Pro Pro Leu Leu Arg Thr Leu Gly Leu Asn Gly	2448

805	810	815	
agt ctt gaa gag atg cct aac tgg att gag cag ctc act cac ctg aag Ser Leu Glu Glu Met Pro Asn Trp Ile Glu Gln Leu Thr His Leu Lys 820	825	830	2496
aag ttc aac tta tgg agt agt aaa cta aag gaa ggt aaa aac atg ctg Lys Phe Asn Leu Trp Ser Ser Lys Leu Lys Glu Gly Lys Asn Met Leu 835	840	845	2544
ata ctt ggg gca ctg ccc aac ctc atg ttc ctt tct ctt tat cat aat Ile Leu Gly Ala Leu Pro Asn Leu Met Phe Leu Ser Leu Tyr His Asn 850	855	860	2592
tct tat ctt ggg gag aag cta gta ttc aaa acg gga gca ttc cca aat Ser Tyr Leu Gly Glu Lys Leu Val Phe Lys Thr Gly Ala Phe Pro Asn 865	870	875	2640
ctt aga aca ctt gtg att ttc aat ttg gat cag cta aga gag atc aga Leu Arg Thr Leu Val Ile Phe Asn Leu Asp Gln Leu Arg Glu Ile Arg 885	890	895	2688
ttt gag gac ggc agc tca ccc cag ttg gaa aag ata gaa atc tct tgc Phe Glu Asp Gly Ser Ser Pro Gln Leu Glu Lys Ile Glu Ile Ser Cys 900	905	910	2736
tgc agg ttg gaa tca ggg att att ggt atc att cac ctt cca agg ctc Cys Arg Leu Glu Ser Gly Ile Ile Gly Ile Ile His Leu Pro Arg Leu 915	920	925	2784
aag gag att tca ctt gaa tac aaa agt aaa gtg gct agg ctt ggt cag Lys Glu Ile Ser Leu Glu Tyr Lys Ser Lys Val Ala Arg Leu Gly Gln 930	935	940	2832
ctg aag gga gaa gtg aac aca cac cca aat cgc ccc gtg ctg cga atg Leu Lys Gly Glu Val Asn Thr His Pro Asn Arg Pro Val Leu Arg Met 945	950	955	2880
gac agt gac cga agg gat cac gac ctg ggg qct gaa gcc gaa gga tct Asp Ser Asp Arg Arg Asp His Asp Leu Gly Ala Glu Ala Glu Gly Ser 965	970	975	2928
tct ata gaa gtgcaaaca gca gat cct gtt cct gat gcc caa gga tca Ser Ile Glu Val Gln Thr Ala Asp Pro Val Pro Asp Ala Gln Gly Ser 980	985	990	2976
gtc act gta gca gtg gaa gca acg gat ccc ctt ccc gag cag gag gga Val Thr Val Ala Val Glu Ala Thr Asp Pro Leu Pro Glu Gln Glu Gly 995	1000	1005	3024
gag agc tcg cag tcg cag gtg atc acg ttg acg acg aat gat agc gaa Glu Ser Ser Gln Ser Gln Val Ile Thr Leu Thr Thr Asn Asp Ser Glu 1010	1015	1020	3072
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1025	1030		

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<213> Oryza minuta

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35 40 45
Gln Ala Phe Leu Arg Ala Ala Glu Val Met Lys Lys Lys Asp Glu Leu
50 55 60
Leu Lys Val Trp Ala Glu Gln Ile Arg Asp Leu Ser Tyr Asp Ile Glu
65 70 75 80
Asp Ser Leu Asp Glu Phe Lys Val His Ile Glu Ser Gln Thr Leu Phe
85 90 95
Arg Gln Leu Val Lys Leu Arg Glu Arg His Arg Ile Ala Ile Arg Ile
100 105 110
His Asn Leu Lys Ser Arg Val Glu Glu Val Ser Ser Arg Asn Thr Arg
115 120 125
Tyr Asn Leu Val Glu Pro Ile Ser Ser Gly Thr Glu Asp Asp Met Asp
130 135 140
Ser Tyr Ala Glu Asp Ile Arg Asn Gln Ser Ala Arg Asn Val Asp Glu
145 150 155 160
Ala Glu Leu Val Gly Phe Ser Asp Ser Lys Lys Arg Leu Leu Glu Met
165 170 175
Ile Asp Thr Asn Ala Asn Asp Gly Pro Ala Lys Val Ile Cys Val Val
180 185 190
Gly Met Gly Gly Leu Gly Lys Thr Ala Leu Ser Arg Lys Ile Phe Glu
195 200 205
Ser Glu Glu Asp Ile Arg Lys Asn Phe Pro Cys Asn Ala Trp Ile Thr
210 215 220
Val Ser Gln Ser Phe His Arg Ile Glu Leu Leu Lys Asp Met Ile Arg
225 230 235 240
Gln Leu Leu Gly Pro Ser Ser Leu Asp Gln Leu Leu His Glu Leu Gln
245 250 255
Gly Lys Val Val Val Gln Val His His Leu Ser Glu Tyr Leu Ile Glu
260 265 270
Glu Leu Lys Glu Lys Arg Tyr Phe Val Val Leu Asp Asp Leu Trp Ile
275 280 285
Leu His Asp Trp Asn Trp Ile Asn Glu Ile Ala Phe Pro Lys Asn Asn
290 295 300
Lys Lys Gly Ser Arg Ile Val Ile Thr Thr Arg Asn Val Asp Leu Ala
305 310 315 320
Glu Lys Cys Ala Thr Ala Ser Leu Val Tyr His Leu Asp Phe Leu Gln
325 330 335
Met Asn Asp Ala Ile Ser Leu Leu Leu Arg Lys Thr Asn Lys Asn His
340 345 350
Glu Asp Met Glu Ser Asn Lys Asn Met Gln Lys Met Val Glu Arg Ile
355 360 365
Val Asn Lys Cys Gly Arg Leu Pro Leu Ala Ile Leu Thr Ile Gly Ala
370 375 380
Val Leu Ala Thr Lys Gln Val Ser Glu Trp Glu Lys Phe Tyr Glu Gln
385 390 395 400
Leu Pro Ser Glu Leu Glu Ile Asn Pro Ser Leu Glu Ala Leu Arg Arg
405 410 415
Met Val Thr Leu Gly Tyr Asn His Leu Pro Ser His Leu Lys Pro Cys
420 425 430
Phe Leu Tyr Leu Ser Ile Phe Pro Glu Asp Phe Glu Ile Gln Arg Asn
435 440 445
Arg Leu Val Gly Arg Trp Ile Ala Glu Gly Phe Val Arg Pro Lys Val
450 455 460
Gly Met Thr Thr Lys Asp Val Gly Glu Ser Tyr Phe Asn Glu Leu Ile
465 470 475 480
Asn Arg Ser Met Ile Gln Arg Ser Arg Val Gly Thr Ala Gly Lys Ile

485	490	495
Lys Thr Cys Arg Ile His Asp Ile Ile Arg Asp Ile Thr Val Ser Ile		
500	505	510
Ser Arg Gln Glu Asn Phe Val Leu Leu Pro Met Gly Asp Gly Ser Asp		
515	520	525
Leu Val Gln Glu Asn Thr Arg His Ile Ala Phe His Gly Ser Met Ser		
530	535	540
Cys Lys Thr Gly Leu Asp Trp Ser Ile Ile Arg Ser Leu Ala Ile Phe		
545	550	555
Gly Asp Arg Pro Lys Ser Leu Ala His Ala Val Cys Pro Asp Gln Leu		
565	570	575
Arg Met Leu Arg Val Leu Asp Leu Glu Asp Val Thr Phe Leu Ile Thr		
580	585	590
Gln Lys Asp Phe Asp Arg Ile Ala Leu Leu Cys His Leu Lys Tyr Leu		
595	600	605
Ser Ile Gly Tyr Ser Ser Ile Tyr Ser Leu Pro Arg Ser Ile Gly		
610	615	620
Lys Leu Gln Gly Leu Gln Thr Leu Asn Met Ser Ser Thr Tyr Ile Ala		
625	630	635
Ala Leu Pro Ser Glu Ile Ser Lys Leu Gln Cys Leu His Thr Leu Arg		
645	650	655
Cys Ile Arg Glu Leu Glu Phe Asp Asn Phe Ser Leu Asn His Pro Met		
660	665	670
Lys Cys Ile Thr Asn Thr Ile Cys Leu Pro Lys Val Phe Thr Pro Leu		
675	680	685
Val Ser Arg Asp Asn Arg Ala Lys Gln Ile Ala Glu Phe His Met Ala		
690	695	700
Thr Lys Ser Phe Trp Ser Glu Ser Phe Gly Val Lys Val Pro Lys Gly		
705	710	715
Ile Gly Lys Leu Arg Asp Leu Gln Val Leu Glu Tyr Val Asp Ile Arg		
725	730	735
Arg Thr Ser Ser Arg Ala Ile Lys Glu Leu Gly Gln Leu Ser Lys Leu		
740	745	750
Arg Lys Leu Ala Val Ile Thr Lys Gly Ser Thr Lys Glu Lys Cys Lys		
755	760	765
Ile Leu Tyr Ala Ala Ile Glu Lys Leu Ser Ser Leu Gln Ser Leu Tyr		
770	775	780
Met Asn Ala Ala Leu Leu Ser Asp Ile Glu Thr Leu Glu Cys Leu Asp		
785	790	795
Ser Ile Ser Ser Pro Pro Leu Leu Arg Thr Leu Gly Leu Asn Gly		
805	810	815
Ser Leu Glu Glu Met Pro Asn Trp Ile Glu Gln Leu Thr His Leu Lys		
820	825	830
Lys Phe Asn Leu Trp Ser Ser Lys Leu Lys Glu Gly Lys Asn Met Leu		
835	840	845
Ile Leu Gly Ala Leu Pro Asn Leu Met Phe Leu Ser Leu Tyr His Asn		
850	855	860
Ser Tyr Leu Gly Glu Lys Leu Val Phe Lys Thr Gly Ala Phe Pro Asn		
865	870	875
Leu Arg Thr Leu Val Ile Phe Asn Leu Asp Gln Leu Arg Glu Ile Arg		
885	890	895
Phe Glu Asp Gly Ser Ser Pro Gln Leu Glu Lys Ile Glu Ile Ser Cys		
900	905	910
Cys Arg Leu Glu Ser Gly Ile Ile Gly Ile Ile His Leu Pro Arg Leu		
915	920	925
Lys Glu Ile Ser Leu Glu Tyr Lys Ser Lys Val Ala Arg Leu Gly Gln		
930	935	940
Leu Lys Gly Glu Val Asn Thr His Pro Asn Arg Pro Val Leu Arg Met		
945	950	955
Asp Ser Asp Arg Arg Asp His Asp Leu Gly Ala Glu Ala Glu Gly Ser		
965	970	975
Ser Ile Glu Val Gln Thr Ala Asp Pro Val Pro Asp Ala Gln Gly Ser		
980	985	990

Val Thr Val Ala Val Glu Ala Thr Asp Pro Leu Pro Glu Gln Glu Gly
 995 1000 1005
 Glu Ser Ser Gln Ser Gln Val Ile Thr Leu Thr Thr Asn Asp Ser Glu
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gga gtg cag aag gag ata tgg ttc atc aaa gat gag cta caa acg ata Gly Val Gln Lys Glu Ile Trp Phe Ile Lys Asp Glu Leu Gln Thr Ile 35 40 45	144
caa gca ttt ttg att gct gcc gaa gca tca aag aaa agc ata cta ttg Gln Ala Phe Leu Ile Ala Ala Glu Ala Ser Lys Lys Ser Ile Leu Leu 50 55 60	192
aag gtt tgg gtg cag caa gta agg gat ctt tcc tat gac atc gaa gat Lys Val Trp Val Gln Gln Val Arg Asp Leu Ser Tyr Asp Ile Glu Asp 65 70 75 80	240
tgc ctt gat gaa ttt aca gtt cat gtg ggc agc caa aac ttg tcg agg Cys Leu Asp Glu Phe Thr Val His Val Gly Ser Gln Asn Leu Ser Arg 85 90 95	288
cag ttg atg aag cta aag gat cgc cat cgg att gcc atc cag atc cgc Gln Leu Met Lys Leu Lys Asp Arg His Arg Ile Ala Ile Gln Ile Arg 100 105 110	336
aat ctc agg aca aga att gaa gaa gta agc act agg aac ata cgc tac Asn Leu Arg Thr Arg Ile Glu Glu Val Ser Thr Arg Asn Ile Arg Tyr 115 120 125	384
aac tta ata gag aat gac ctc acc tgc acc act gat gag agg aat tta Asn Leu Ile Glu Asn Asp Leu Thr Cys Thr Asp Glu Arg Asn Leu 130 135 140	432
ttt atg gaa gac att cgc aat caa tca gct aac aac atc gag gaa gct Phe Met Glu Asp Ile Arg Asn Gln Ser Ala Asn Asn Ile Glu Glu Ala 145 150 155 160	480
gat ctt gtg ggt ttt tct gga ccc aaa aga gag ttg ctt gat ctt ata Asp Leu Val Gly Phe Ser Gly Pro Lys Arg Glu Leu Leu Asp Leu Ile 165 170 175	528
gat gtc cat gcc aag gac gga cct aca aag gtt gta tgt gtt gtc ggt	576

Asp Val His Ala Lys Asp Gly Pro Thr Lys Val Val Cys Val Val Gly			
180	185	190	
atg ggt ggt ttg ggt aag act act att gca agg aaa att tat gaa agc	624		
Met Gly Gly Leu Gly Lys Thr Thr Ile Ala Arg Lys Ile Tyr Glu Ser			
195	200	205	
aaa gag gac att gca aag aat ttt tct tgc tgt gct tgg att act gtt	672		
Lys Glu Asp Ile Ala Lys Asn Phe Ser Cys Cys Ala Trp Ile Thr Val			:
210	215	220	
tca cag tcc ttt gtt agg gtg gaa cta ctc aag gat ttg atg gtg aaa	720		
Ser Gln Ser Phe Val Arg Val Glu Leu Leu Lys Asp Leu Met Val Lys			
225	230	235	240
ctt ttt gga gag gaa gta ctg aag aag cgg ccg aga gaa ctc gaa ggg	768		
Leu Phe Gly Glu Val Leu Lys Lys Arg Pro Arg Glu Leu Glu Gly			
245	250	255	
aag gtt cca caa gta gat gac ctt gcc agc tac ctc agg aca gag tta	816		
Lys Val Pro Gln Val Asp Asp Leu Ala Ser Tyr Leu Arg Thr Glu Leu			
260	265	270	
cat gaa agg agg tac ttt gtt gtg ctt gat gac gtg tgg agt aca gat	864		
His Glu Arg Arg Tyr Phe Val Val Leu Asp Asp Val Trp Ser Thr Asp			
275	280	285	
tca tgg aaa tgg att aat agt att gcc ttc cct aga aat aac aaa aaa	912		
Ser Trp Lys Trp Ile Asn Ser Ile Ala Phe Pro Arg Asn Asn Lys Lys			
290	295	300	
ggg agc cgg gtg ata gta aca aca aga gat gtt ggc tta gct aag aag	960		
Gly Ser Arg Val Ile Val Thr Thr Arg Asp Val Gly Leu Ala Lys Lys			
305	310	315	320
tgt act tct gaa ttg ctt atc tac cag ctt aaa ccc cta gaa ata aac	1008		
Cys Thr Ser Glu Leu Leu Ile Tyr Gln Leu Lys Pro Leu Glu Ile Asn			
325	330	335	
tat gca aaa gag ttg ctt cta cgg aaa gca aat gaa gca ata gga gat	1056		
Tyr Ala Lys Glu Leu Leu Leu Arg Lys Ala Asn Glu Ala Ile Gly Asp			
340	345	350	
atg gaa agt gat aaa aag atg agt gac att ata act aaa ata gta aag	1104		
Met Glu Ser Asp Lys Lys Met Ser Asp Ile Ile Thr Lys Ile Val Lys			
355	360	365	
aag tgt ggg tat tta ccg ctg gct ata ctc aca ata gga ggc gtg ctt	1152		
Lys Cys Gly Tyr Leu Pro Leu Ala Ile Leu Thr Ile Gly Gly Val Leu			
370	375	380	
tcc acc aaa gag ata aga gag tgg gaa act ttt tat agt cag ata cct	1200		
Ser Thr Lys Glu Ile Arg Glu Trp Glu Thr Phe Tyr Ser Gln Ile Pro			
385	390	395	400
tca gag ctt gag agc aac cca aac ctt gaa gca atg aga agg ata gtg	1248		
Ser Glu Leu Glu Ser Asn Pro Asn Leu Glu Ala Met Arg Arg Ile Val			
405	410	415	
acc cta agt tac aac tac tta ccg tct cat ctt aag caa tgc ttt ttg	1296		
Thr Leu Ser Tyr Asn Tyr Leu Pro Ser His Leu Lys Gln Cys Phe Leu			
420	425	430	

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gta aat aga tgg att gca gag ggg ttt att aaa gct agg act aat atg Val Asn Arg Trp Ile Ala Glu Gly Phe Ile Lys Ala Arg Thr Asn Met	450 455 460	1392
act att gaa gat gtt ggg aaa agt tac ttt aaa gaa ctt atc aac cgt Thr Ile Glu Asp Val Gly Lys Ser Tyr Phe Lys Glu Leu Ile Asn Arg	465 470 475 480	1440
agc atg att cag tca tca aga gcg ggt ata cga gga gat ttt aag agc Ser Met Ile Gln Ser Ser Arg Ala Gly Ile Arg Gly Asp Phe Lys Ser	485 490 495	1488
tgt cga gtc cat gac atc atg cgt gat att aca att tcg att tct aga Cys Arg Val His Asp Ile Met Arg Asp Ile Thr Ile Ser Ile Ser Arg	500 505 510	1536
gaa gaa aat ttc aca ctc tta ccc gat ggc act gac tat gat gta gta Glu Glu Asn Phe Thr Leu Leu Pro Asp Gly Thr Asp Tyr Asp Val Val	515 520 525	1584
cat ggg aac act cgg cac ata gca ttt cac ggg agt agg tat tgc tct His Gly Asn Thr Arg His Ile Ala Phe His Gly Ser Arg Tyr Cys Ser	530 535 540	1632
gaa aca agc ttg gac tgg agc att ata cgg tca tta act atg ttt ggt Glu Thr Ser Leu Asp Trp Ser Ile Ile Arg Ser Leu Thr Met Phe Gly	545 550 555 560	1680
gag agg tcc gta gaa cta gag cat tca gtt tgt tca tct cag ttg agg Glu Arg Ser Val Glu Leu Glu His Ser Val Cys Ser Ser Gln Leu Arg	565 570 575	1728
atg tta cgg gtc ttg gat cta ata gat gca caa ttt tct atc aca caa Met Leu Arg Val Leu Asp Leu Ile Asp Ala Gln Phe Ser Ile Thr Gln	580 585 590	1776
aat gat gtc gac aac ata gtg ctc ttg tgc cac ttg aaa tac cta cgc Asn Asp Val Asp Asn Ile Val Leu Leu Cys His Leu Lys Tyr Leu Arg	595 600 605	1824
att gca aga tac aga tac cgt tca cca tat att tat tca ctt cca caa Ile Ala Arg Tyr Arg Tyr Ser Pro Tyr Ile Tyr Ser Leu Pro Gln	610 615 620	1872
tcc ata gct aga ctg cat ggt ctg cag aca ttg gac ttg ggt cag acg Ser Ile Ala Arg Leu His Gly Leu Gln Thr Leu Asp Leu Gly Gln Thr	625 630 635 640	1920
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gcc ttc gat gca tga aagaatattt ttcttcttct ttaagaacat atttaactaa Ala Phe Asp Ala *	660	2023
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 Gly Val Gln Lys Glu Ile Trp Phe Ile Lys Asp Glu Leu Gln Thr Ile
 35 40 45
 Gln Ala Phe Leu Ile Ala Ala Glu Ala Ser Lys Lys Ser Ile Leu Leu
 50 55 60
 Lys Val Trp Val Gln Gln Val Arg Asp Leu Ser Tyr Asp Ile Glu Asp
 65 70 75 80
 Cys Leu Asp Glu Phe Thr Val His Val Gly Ser Gln Asn Leu Ser Arg
 85 90 95
 Gln Leu Met Lys Leu Lys Asp Arg His Arg Ile Ala Ile Gln Ile Arg
 100 105 110
 Asn Leu Arg Thr Arg Ile Glu Glu Val Ser Thr Arg Asn Ile Arg Tyr
 115 120 125
 Asn Leu Ile Glu Asn Asp Leu Thr Cys Thr Asp Glu Arg Asn Leu
 130 135 140
 Phe Met Glu Asp Ile Arg Asn Gln Ser Ala Asn Asn Ile Glu Glu Ala
 145 150 155 160
 Asp Leu Val Gly Phe Ser Gly Pro Lys Arg Glu Leu Leu Asp Leu Ile
 165 170 175
 Asp Val His Ala Lys Asp Gly Pro Thr Lys Val Val Cys Val Val Gly

180	185	190
Met Gly Gly Leu Gly Lys Thr Thr Ile Ala Arg Lys Ile Tyr Glu Ser		
195	200	205
Lys Glu Asp Ile Ala Lys Asn Phe Ser Cys Cys Ala Trp Ile Thr Val		
210	215	220
Ser Gln Ser Phe Val Arg Val Glu Leu Leu Lys Asp Leu Met Val Lys		
225	230	235
Leu Phe Gly Glu Glu Val Leu Lys Lys Arg Pro Arg Glu Leu Glu Gly		
245	250	255
Lys Val Pro Gln Val Asp Asp Leu Ala Ser Tyr Leu Arg Thr Glu Leu		
260	265	270
His Glu Arg Arg Tyr Phe Val Val Leu Asp Asp Val Trp Ser Thr Asp		
275	280	285
Ser Trp Lys Trp Ile Asn Ser Ile Ala Phe Pro Arg Asn Asn Lys Lys		
290	295	300
Gly Ser Arg Val Ile Val Thr Thr Arg Asp Val Gly Leu Ala Lys Lys		
305	310	315
Cys Thr Ser Glu Leu Leu Ile Tyr Gln Leu Lys Pro Leu Glu Ile Asn		
325	330	335
Tyr Ala Lys Glu Leu Leu Arg Lys Ala Asn Glu Ala Ile Gly Asp		
340	345	350
Met Glu Ser Asp Lys Lys Met Ser Asp Ile Ile Thr Lys Ile Val Lys		
355	360	365
Lys Cys Gly Tyr Leu Pro Leu Ala Ile Leu Thr Ile Gly Gly Val Leu		
370	375	380
Ser Thr Lys Glu Ile Arg Glu Trp Glu Thr Phe Tyr Ser Gln Ile Pro		
385	390	395
Ser Glu Leu Glu Ser Asn Pro Asn Leu Glu Ala Met Arg Arg Ile Val		
405	410	415
Thr Leu Ser Tyr Asn Tyr Leu Pro Ser His Leu Lys Gln Cys Phe Leu		
420	425	430
Tyr Leu Ser Ile Phe Pro Glu Asp Phe Glu Ile Asn Arg Asn Arg Leu		
435	440	445
Val Asn Arg Trp Ile Ala Glu Gly Phe Ile Lys Ala Arg Thr Asn Met		
450	455	460
Thr Ile Glu Asp Val Gly Lys Ser Tyr Phe Lys Glu Leu Ile Asn Arg		
465	470	475
Ser Met Ile Gln Ser Ser Arg Ala Gly Ile Arg Gly Asp Phe Lys Ser		
485	490	495
Cys Arg Val His Asp Ile Met Arg Asp Ile Thr Ile Ser Ile Ser Arg		
500	505	510
Glu Glu Asn Phe Thr Leu Leu Pro Asp Gly Thr Asp Tyr Asp Val Val		
515	520	525
His Gly Asn Thr Arg His Ile Ala Phe His Gly Ser Arg Tyr Cys Ser		
530	535	540
Glu Thr Ser Leu Asp Trp Ser Ile Ile Arg Ser Leu Thr Met Phe Gly		
545	550	555
Glu Arg Ser Val Glu Leu Glu His Ser Val Cys Ser Ser Gln Leu Arg		
565	570	575
Met Leu Arg Val Leu Asp Leu Ile Asp Ala Gln Phe Ser Ile Thr Gln		
580	585	590
Asn Asp Val Asp Asn Ile Val Leu Leu Cys His Leu Lys Tyr Leu Arg		
595	600	605
Ile Ala Arg Tyr Arg Tyr Arg Ser Pro Tyr Ile Tyr Ser Leu Pro Gln		
610	615	620
Ser Ile Ala Arg Leu His Gly Leu Gln Thr Leu Asp Leu Gly Gln Thr		
625	630	635
Tyr Ile Ser Thr Leu Pro Thr Gln Ile Thr Asn Phe Gly Val Ser Val		
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Ala Phe Asp Ala		
660		

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atc agc aag gcc gcc tcc gct gct gcc gac gag acc agc ctc ctg ctg      96
Ile Ser Lys Ala Ala Ser Ala Ala Asp Glu Thr Ser Leu Leu Leu
    20          25          30

ggc gtc gag aaa gac atc tgg tat atc aaa gat gag cta aaa acg atg      144
Gly Val Glu Lys Asp Ile Trp Tyr Ile Lys Asp Glu Leu Lys Thr Met
    35          40          45

caa gca ttc ctt aga gct gct gaa ctt atg aaa aag aaa gat gaa cta      192
Gln Ala Phe Leu Arg Ala Ala Glu Leu Met Lys Lys Asp Glu Leu
    50          55          60

tta aag gtt tgg gca gag caa ata cgt gac ctg tca tat gac att gaa      240
Leu Lys Val Trp Ala Glu Gln Ile Arg Asp Leu Ser Tyr Asp Ile Glu
    65          70          75          80

gat tcc ctt gat gaa ttt aag gtc cat att gaa agc caa acc cta ttt      288
Asp Ser Leu Asp Glu Phe Lys Val His Ile Glu Ser Gln Thr Leu Phe
    85          90          95

cgt cag ttg gtg aaa ctc aga gaa cgc cac cga att gct atc cgt atc      336
Arg Gln Leu Val Lys Leu Arg Glu Arg His Arg Ile Ala Ile Arg Ile
    100         105         110

cac aac ctt aaa tca aga gtt gaa gaa gtg agt agc agg aac aca cgc      384
His Asn Leu Lys Ser Arg Val Glu Glu Val Ser Ser Arg Asn Thr Arg
    115         120         125

tac agt tta gtc aag cct att tcc tct ggc aca gag att gac atg gat      432
Tyr Ser Leu Val Lys Pro Ile Ser Ser Gly Thr Glu Ile Asp Met Asp
    130         135         140

tcc tat gca gaa gac att cgt aat cag tca gct cgc aat gtg gat gag      480
Ser Tyr Ala Glu Asp Ile Arg Asn Gln Ser Ala Arg Asn Val Asp Glu
    145         150         155         160

gct gag ctt gtt ggg ttt tct gac tcc aag aaa agg ctg ctt gaa atg      528
Ala Glu Leu Val Gly Phe Ser Asp Ser Lys Lys Arg Leu Leu Glu Met
    165         170         175

atc gat acc aat gct aat gat ggt ccg gcc aag gta atc tgt gtt gtt      576
Ile Asp Thr Asn Ala Asn Asp Gly Pro Ala Lys Val Ile Cys Val Val
    180         185         190

ggg atg ggt ggt tta ggc aag aca gct ctt tcg agg aag atc ttt gaa      624
Gly Met Gly Gly Leu Gly Lys Thr Ala Leu Ser Arg Lys Ile Phe Glu
    195         200         205

agc gaa gaa gac att agg aag aac ttc cct tgc aat gct tgg att aca      672

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Ser Glu Glu Asp Ile Arg Lys Asn Phe Pro Cys Asn Ala Trp Ile Thr			
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Val Ser Gln Ser Phe His Arg Ile Glu Leu Leu Lys Asp Met Ile Arg			
225	230	235	240
caa ctt ctt ggc ccc agt tct ctg gat caa ctc ttg caa gaa ttg caa			768
Gln Leu Leu Gly Pro Ser Ser Leu Asp Gln Leu Leu Gln Glu Leu Gln			
245	250	255	
ggg aag gtg gtg gtg caa gta cat cat ctt tct gag tac ctg ata gaa			816
Gly Lys Val Val Val Gln Val His His Leu Ser Glu Tyr Leu Ile Glu			
260	265	270	
gag ctc aag gag aag agg tac ttt gtt cta gat gat cta tgg att			864
Glu Leu Lys Glu Lys Arg Tyr Phe Val Val Leu Asp Asp Leu Trp Ile			
275	280	285	
tta cat gat tgg aat tgg ata aat gaa att gca ttt cct aag aac aat			912
Leu His Asp Trp Asn Trp Ile Asn Glu Ile Ala Phe Pro Lys Asn Asn			
290	295	300	
aag aag ggc agt cga ata gta ata acc act cgg aat gtt gat ctt gcg			960
Lys Lys Gly Ser Arg Ile Val Ile Thr Thr Arg Asn Val Asp Leu Ala			
305	310	315	320
gag aag tgt gcc aca gcc tca ctg gtg tac cac ctt gat ttc ttg cag			1008
Glu Lys Cys Ala Thr Ala Ser Leu Val Tyr His Leu Asp Phe Leu Gln			
325	330	335	
atg aac gat gcc ata aca ttg cta ctg aga aaa aca aat aaa aat cat			1056
Met Asn Asp Ala Ile Thr Leu Leu Leu Arg Lys Thr Asn Lys Asn His			
340	345	350	
gaa gac atg gaa tca aat aaa aat atg caa aag atg gtt gaa cga att			1104
Glu Asp Met Glu Ser Asn Lys Asn Met Gln Lys Met Val Glu Arg Ile			
355	360	365	
gta aat aaa tgt ggt cgt cta cca tta gca ata ctt aca ata gga gct			1152
Val Asn Lys Cys Gly Arg Leu Pro Leu Ala Ile Leu Thr Ile Gly Ala			
370	375	380	
gtg ctt gca act aaa cag gtg tca gaa tgg gag aaa ttc tat gaa cac			1200
Val Leu Ala Thr Lys Gln Val Ser Glu Trp Glu Lys Phe Tyr Glu His			
385	390	395	400
ctt cct tca gaa cta gaa ata aac cca agc ctg gaa gct ttg agg aga			1248
Leu Pro Ser Glu Leu Glu Ile Asn Pro Ser Leu Glu Ala Leu Arg Arg			
405	410	415	
atg gtg acc cta ggt tac aac cac cta cca tcc cat ttg aaa cca tgc			1296
Met Val Thr Leu Gly Tyr Asn His Leu Pro Ser His Leu Lys Pro Cys			
420	425	430	
ttt ttg tat cta agt atc ttt cct gag gat ttt gaa atc aaa agg aat			1344
Phe Leu Tyr Leu Ser Ile Phe Pro Glu Asp Phe Glu Ile Lys Arg Asn			
435	440	445	
cgt cta gta ggt aga tgg ata gca gaa ggg ttt gtt aga cca aag gtt			1392
Arg Leu Val Gly Arg Trp Ile Ala Glu Gly Phe Val Arg Pro Lys Val			
450	455	460	

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aac cga agt atg att caa cga tca aga gtg ggc ata gca gga aaa att Asn Arg Ser Met Ile Gln Arg Ser Arg Val Gly Ile Ala Gly Lys Ile 485 490 495	1488
aag act tgt cga att cat gat atc atc cgt gat atc aca gtt tca atc Lys Thr Cys Arg Ile His Asp Ile Ile Arg Asp Ile Thr Val Ser Ile 500 505 510	1536
tcg aga cag gaa aat ttt gta tta tta cca atg gga gat ggc tct gat Ser Arg Gln Glu Asn Phe Val Leu Leu Pro Met Gly Asp Gly Ser Asp 515 520 525	1584
tta gtt cag gaa aac act cgc cac ata gca ttc cat ggg agt atg tcc Leu Val Gln Glu Asn Thr Arg His Ile Ala Phe His Gly Ser Met Ser 530 535 540	1632
tgc aaa act gga ttg gat tgg agc att att cga tca tta gct att ttt Cys Lys Thr Gly Leu Asp Trp Ser Ile Ile Arg Ser Leu Ala Ile Phe 545 550 555 560	1680
ggt gac aga ccc aag agt cta gca cat gca gtt tgt cca gat caa ttg Gly Asp Arg Pro Lys Ser Leu Ala His Ala Val Cys Pro Asp Gln Leu 565 570 575	1728
agg atg tta cgg gtc ttg gat ctt gaa gat gtg aca ttc tta atc act Arg Met Leu Arg Val Leu Asp Leu Glu Asp Val Thr Phe Leu Ile Thr 580 585 590	1776
caa aaa gat ttc gac cgt att gca ttg ttg tgc cac ttg aaa tac ttg Gln Lys Asp Phe Asp Arg Ile Ala Leu Leu Cys His Leu Lys Tyr Leu 595 600 605	1824
agt att gga tat tcg tca tcc ata tat tca ctt ccc aga tcc att ggt Ser Ile Gly Tyr Ser Ser Ile Tyr Ser Leu Pro Arg Ser Ile Gly 610 615 620	1872
aaa cta cag ggc cta caa act ttg aac atg ccg agc aca tac att gca Lys Leu Gln Gly Leu Gln Thr Leu Asn Met Pro Ser Thr Tyr Ile Ala 625 630 635 640	1920
gca cta cca agt gag atc agt aaa ctc caa tgt ctg cat act ctt cgt Ala Leu Pro Ser Glu Ile Ser Lys Leu Gln Cys Leu His Thr Leu Arg 645 650 655	1968
tgt ata gga cag ttt cat tat gac aac ttt agt cta aac cac cca atg Cys Ile Gly Gln Phe His Tyr Asp Asn Phe Ser Leu Asn His Pro Met 660 665 670	2016
aag tgc ata act aac aca ata tgc ctg cct aaa gta ttc aca cct tta Lys Cys Ile Thr Asn Thr Ile Cys Leu Pro Lys Val Phe Thr Pro Leu 675 680 685	2064
gtt agt cgc gat gat cgt gca aaa caa att gct gaa ttg cac atg gcc Val Ser Arg Asp Asp Arg Ala Lys Gln Ile Ala Glu Leu His Met Ala 690 695 700	2112
acc aaa agt tgc tgg tct gaa tca atc ggt gtg aag gta ccc aaa gga Thr Lys Ser Cys Trp Ser Glu Ser Ile Gly Val Lys Val Pro Lys Gly 705 710 715 720	2160

ata ggt aag ttg cga gac ttg cag gtt cta gag tat gta gat atc agg Ile Gly Lys Leu Arg Asp Leu Gln Val Leu Glu Tyr Val Asp Ile Arg	725	730	735	2208
cg ^g acc agt agt aga gca atc aaa gag ctg ggg cag tta agc aag ctg Arg Thr Ser Ser Arg Ala Ile Lys Glu Leu Gly Gln Leu Ser Lys Leu	740	745	750	2256
agg aaa tta ggt gtg aca aca aac ggg tcg aca aag gaa aaa tgt aag Arg Lys Leu Gly Val Thr Thr Asn Gly Ser Thr Lys Glu Lys Cys Lys	755	760	765	2304
ata ctt tat gca gcc att gag aag ctc tct tcc ctc caa tct ctc cat Ile Leu Tyr Ala Ala Ile Glu Lys Leu Ser Ser Leu Gln Ser Leu His	770	775	780	2352
gtg gat gct gca gga atc tca gat ggt gga aca ctt gag tgc cta gat Val Asp Ala Ala Gly Ile Ser Asp Gly Gly Thr Leu Glu Cys Leu Asp	785	790	795	800
tct att tca tct cct ccc cta ctg agg aca ctc gtg ttg gat gga Ser Ile Ser Ser Pro Pro Leu Leu Arg Thr Leu Val Leu Asp Gly	805	810	815	2448
att ctt gag gag atg cct aac tgg att gag cag ctc act cac ctg aag Ile Leu Glu Glu Met Pro Asn Trp Ile Glu Gln Leu Thr His Leu Lys	820	825	830	2496
aag atc tac tta ttg agg agc aaa cta aag gaa ggt aaa acc atg ctg Lys Ile Tyr Leu Leu Arg Ser Lys Leu Lys Glu Gly Lys Thr Met Leu	835	840	845	2544
ata ctt ggg gca ctg ccc aac ctc atg gtc ctt cat ctt tat cg ^g aat Ile Leu Gly Ala Leu Pro Asn Leu Met Val Leu His Leu Tyr Arg Asn	850	855	860	2592
gct tac ctt ggg gag aag cta gta ttc aaa aca gga gca ttc cca aat Ala Tyr Leu Gly Glu Lys Leu Val Phe Lys Thr Gly Ala Phe Pro Asn	865	870	875	880
ctt aga aca ctt tgg att tat gaa ttg gat cag cta aga gag atc aga Leu Arg Thr Leu Trp Ile Tyr Glu Leu Asp Gln Leu Arg Glu Ile Arg	885	890	895	2688
ttt gag gac ggc agc tca ccc ctg ttg gaa aag ata gaa ata ggc gag Phe Glu Asp Gly Ser Ser Pro Leu Leu Glu Lys Ile Glu Ile Gly Glu	900	905	910	2736
tgc agg ttg gaa tct ggg att act ggt atc att cac ctt cca aag ctc Cys Arg Leu Glu Ser Gly Ile Thr Gly Ile Ile His Leu Pro Lys Leu	915	920	925	2784
aag gag att cca att aga tac gga agt aaa gtg gct ggg ctt ggt cag Lys Glu Ile Pro Ile Arg Tyr Gly Ser Lys Val Ala Gly Leu Gly Gln	930	935	940	2832
ctg gag gga gaa gtg aac gca cac cca aat cgc ccc gtg ctg cta atg Leu Glu Gly Glu Val Asn Ala His Pro Asn Arg Pro Val Leu Leu Met	945	950	955	2880
tac agt gac cga agg tat cac gac ctg ggg gct gaa gcc gaa gga tct Tyr Ser Asp Arg Arg Tyr His Asp Leu Gly Ala Glu Ala Glu Gly Ser				2928

965	970	975	
tct ata gaa gtg caa aca gca gat cct gtt cct gat gcc gaa gga tca Ser Ile Glu Val Gln Thr Ala Asp Pro Val Pro Asp Ala Glu Gly Ser 980	985	990	2976
gtc act gta gca gtg gaa gca acg gat ccc ctt ccc gag cag gag gga Val Thr Val Ala Val Glu Ala Thr Asp Pro Leu Pro Glu Gln Glu Gly 995	1000	1005	3024
gag agc tcg cag tcg cag gtg atc acg ttg acg acg aat gat agc gaa Glu Ser Ser Gln Ser Gln Val Ile Thr Leu Thr Thr Asn Asp Ser Glu 1010	1015	1020	3072
gag ata ggc aca gct caa gct ggc tga Glu Ile Gly Thr Ala Gln Ala Gly *	1025	1030	3099
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Gln Ala Phe Leu Arg Ala Ala Glu Leu Met Lys Lys Lys Asp Glu Leu 50 55 60			
Leu Lys Val Trp Ala Glu Gln Ile Arg Asp Leu Ser Tyr Asp Ile Glu 65 70 75 80			
Asp Ser Leu Asp Glu Phe Lys Val His Ile Glu Ser Gln Thr Leu Phe 85 90 95			
Arg Gln Leu Val Lys Leu Arg Glu Arg His Arg Ile Ala Ile Arg Ile 100 105 110			
His Asn Leu Lys Ser Arg Val Glu Glu Val Ser Ser Arg Asn Thr Arg 115 120 125			
Tyr Ser Leu Val Lys Pro Ile Ser Ser Gly Thr Glu Ile Asp Met Asp 130 135 140			
Ser Tyr Ala Glu Asp Ile Arg Asn Gln Ser Ala Arg Asn Val Asp Glu 145 150 155 160			
Ala Glu Leu Val Gly Phe Ser Asp Ser Lys Lys Arg Leu Leu Glu Met 165 170 175			
Ile Asp Thr Asn Ala Asn Asp Gly Pro Ala Lys Val Ile Cys Val Val 180 185 190			
Gly Met Gly Leu Gly Lys Thr Ala Leu Ser Arg Lys Ile Phe Glu 195 200 205			
Ser Glu Glu Asp Ile Arg Lys Asn Phe Pro Cys Asn Ala Trp Ile Thr 210 215 220			
Val Ser Gln Ser Phe His Arg Ile Glu Leu Leu Lys Asp Met Ile Arg 225 230 235 240			
Gln Leu Leu Gly Pro Ser Ser Leu Asp Gln Leu Leu Gln Glu Leu Gln 245 250 255			
Gly Lys Val Val Val Gln Val His His Leu Ser Glu Tyr Leu Ile Glu 260 265 270			
Glu Leu Lys Glu Lys Arg Tyr Phe Val Val Leu Asp Asp Leu Trp Ile 275 280 285			
Leu His Asp Trp Asn Trp Ile Asn Glu Ile Ala Phe Pro Lys Asn Asn 290 295 300			

Lys Lys Gly Ser Arg Ile Val Ile Thr Thr Arg Asn Val Asp Leu Ala
 305 310 315 320
 Glu Lys Cys Ala Thr Ala Ser Leu Val Tyr His Leu Asp Phe Leu Gln
 325 330 335
 Met Asn Asp Ala Ile Thr Leu Leu Leu Arg Lys Thr Asn Lys Asn His
 340 345 350
 Glu Asp Met Glu Ser Asn Lys Asn Met Gln Lys Met Val Glu Arg Ile
 355 360 365
 Val Asn Lys Cys Gly Arg Leu Pro Leu Ala Ile Leu Thr Ile Gly Ala
 370 375 380
 Val Leu Ala Thr Lys Gln Val Ser Glu Trp Glu Lys Phe Tyr Glu His
 385 390 395 400
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 405 410 415
 Met Val Thr Leu Gly Tyr Asn His Leu Pro Ser His Leu Lys Pro Cys
 420 425 430
 Phe Leu Tyr Leu Ser Ile Phe Pro Glu Asp Phe Glu Ile Lys Arg Asn
 435 440 445
 Arg Leu Val Gly Arg Trp Ile Ala Glu Gly Phe Val Arg Pro Lys Val
 450 455 460
 Gly Met Thr Thr Lys Asp Val Gly Glu Ser Tyr Phe Asn Glu Leu Ile
 465 470 475 480
 Asn Arg Ser Met Ile Gln Arg Ser Arg Val Gly Ile Ala Gly Lys Ile
 485 490 495
 Lys Thr Cys Arg Ile His Asp Ile Ile Arg Asp Ile Thr Val Ser Ile
 500 505 510
 Ser Arg Gln Glu Asn Phe Val Leu Leu Pro Met Gly Asp Gly Ser Asp
 515 520 525
 Leu Val Gln Glu Asn Thr Arg His Ile Ala Phe His Gly Ser Met Ser
 530 535 540
 Cys Lys Thr Gly Leu Asp Trp Ser Ile Ile Arg Ser Leu Ala Ile Phe
 545 550 555 560
 Gly Asp Arg Pro Lys Ser Leu Ala His Ala Val Cys Pro Asp Gln Leu
 565 570 575
 Arg Met Leu Arg Val Leu Asp Leu Glu Asp Val Thr Phe Leu Ile Thr
 580 585 590
 Gln Lys Asp Phe Asp Arg Ile Ala Leu Leu Cys His Leu Lys Tyr Leu
 595 600 605
 Ser Ile Gly Tyr Ser Ser Ser Ile Tyr Ser Leu Pro Arg Ser Ile Gly
 610 615 620
 Lys Leu Gln Gly Leu Gln Thr Leu Asn Met Pro Ser Thr Tyr Ile Ala
 625 630 635 640
 Ala Leu Pro Ser Glu Ile Ser Lys Leu Gln Cys Leu His Thr Leu Arg
 645 650 655
 Cys Ile Gly Gln Phe His Tyr Asp Asn Phe Ser Leu Asn His Pro Met
 660 665 670
 Lys Cys Ile Thr Asn Thr Ile Cys Leu Pro Lys Val Phe Thr Pro Leu
 675 680 685
 Val Ser Arg Asp Asp Arg Ala Lys Gln Ile Ala Glu Leu His Met Ala
 690 695 700
 Thr Lys Ser Cys Trp Ser Glu Ser Ile Gly Val Lys Val Pro Lys Gly
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 Ile Gly Lys Leu Arg Asp Leu Gln Val Leu Glu Tyr Val Asp Ile Arg
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 Arg Thr Ser Ser Arg Ala Ile Lys Glu Leu Gly Gln Leu Ser Lys Leu
 740 745 750
 Arg Lys Leu Gly Val Thr Thr Asn Gly Ser Thr Lys Glu Lys Cys Lys
 755 760 765
 Ile Leu Tyr Ala Ala Ile Glu Lys Leu Ser Ser Leu Gln Ser Leu His
 770 775 780
 Val Asp Ala Ala Gly Ile Ser Asp Gly Gly Thr Leu Glu Cys Leu Asp
 785 790 795 800
 Ser Ile Ser Ser Pro Pro Leu Leu Arg Thr Leu Val Leu Asp Gly

805	810	815
Ile Leu Glu Glu Met Pro Asn Trp Ile Glu Gln Leu Thr His Leu Lys		
820	825	830
Lys Ile Tyr Leu Leu Arg Ser Lys Leu Lys Glu Gly Lys Thr Met Leu		
835	840	845
Ile Leu Gly Ala Leu Pro Asn Leu Met Val Leu His Leu Tyr Arg Asn		
850	855	860
Ala Tyr Leu Gly Glu Lys Leu Val Phe Lys Thr Gly Ala Phe Pro Asn		
865	870	875
Leu Arg Thr Leu Trp Ile Tyr Glu Leu Asp Gln Leu Arg Glu Ile Arg		
885	890	895
Phe Glu Asp Gly Ser Ser Pro Leu Leu Glu Lys Ile Glu Ile Gly Glu		
900	905	910
Cys Arg Leu Glu Ser Gly Ile Thr Gly Ile Ile His Leu Pro Lys Leu		
915	920	925
Lys Glu Ile Pro Ile Arg Tyr Gly Ser Lys Val Ala Gly Leu Gly Gln		
930	935	940
Leu Glu Gly Glu Val Asn Ala His Pro Asn Arg Pro Val Leu Leu Met		
945	950	955
Tyr Ser Asp Arg Arg Tyr His Asp Leu Gly Ala Glu Ala Glu Gly Ser		
965	970	975
Ser Ile Glu Val Gln Thr Ala Asp Pro Val Pro Asp Ala Glu Gly Ser		
980	985	990
Val Thr Val Ala Val Glu Ala Thr Asp Pro Leu Pro Glu Gln Glu Gly		
995	1000	1005
Glu Ser Ser Gln Ser Gln Val Ile Thr Leu Thr Thr Asn Asp Ser Glu		
1010	1015	1020
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agcaatgtttt ctattatagg c atg gac tgg agc cat gta cgg tcg tta act 351
Met Asp Trp Ser His Val Arg Ser Leu Thr
1 5 10

ttt ttt ggc gat gag aga ccc aaa gag ctc tca cct cca ttc tgt tct 399
Leu Phe Gly Asp Glu Arg Pro Lys Glu Leu Ser Pro Pro Phe Cys Ser
15 20 25

ccc caa ttg aaa atg cta agg gtg ctg gat cta cta gat att ata ttt 447
Pro Gln Leu Lys Met Leu Arg Val Leu Asp Leu Leu Asp Ile Ile Phe
30 35 40

gga cta gca aaa aga tat gga taa aatatggttt ttgcgttact tgaaatatgt 501
Gly Leu Ala Lys Arg Tyr Gly *
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 Pro Lys Glu Leu Ser Pro Pro Phe Cys Ser Pro Gln Leu Lys Met Leu
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 Arg Val Leu Asp Leu Leu Asp Ile Ile Phe Gly Leu Ala Lys Arg Tyr
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 Gly

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 Met Ala Glu Thr Val Leu Ser Met Ala Arg Ser Leu Val Gly Ser Ala
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 Ile Ser Lys Ala Ala Ser Ala Ala Asp Glu Thr Ser Leu Leu Leu
 20 25 30

 ggc gtc gag aaa gac atc tgg tac ttg ttt aga cat ggt gtt gga cgg 144
 Gly Val Glu Lys Asp Ile Trp Tyr Leu Phe Arg His Gly Val Gly Arg
 35 40 45

 tcg aat ggt ggg cct gtt gta ggt atg gtg gca tct ggc aac cag tca 192
 Ser Asn Gly Gly Pro Val Val Gly Met Val Ala Ser Gly Asn Gln Ser
 50 55 60

 tgc tta gca ata gat tcc tat gca gaa gac att cgcc aat caa tca gct 240
 Cys Leu Ala Ile Asp Ser Tyr Ala Glu Asp Ile Arg Asn Gln Ser Ala
 65 70 75 80

 cga aat gtg gat gaa gct gag ctt gtt ggg ttt tct gac tcc aag aaa 288
 Arg Asn Val Asp Glu Ala Glu Leu Val Gly Phe Ser Asp Ser Lys Lys

85	90	95	
agg ctg ctt gaa atg atc gat acc aat gct aat gat ggt ccg gcc aag Arg Leu Leu Glu Met Ile Asp Thr Asn Ala Asn Asp Gly Pro Ala Lys 100	105	110	336
gta atc tgt gtt gtt ggg atg ggt ggt tta ggc aag aca gct ctt tcg Val Ile Cys Val Val Gly Met Gly Gly Leu Gly Lys Thr Ala Leu Ser 115	120	125	384
agg aag atc ttt gaa agc gaa gac att agg aag aac ttc cct tgc Arg Lys Ile Phe Glu Ser Glu Glu Asp Ile Arg Lys Asn Phe Pro Cys 130	135	140	432
aat gct tgg att aca gtg tca caa tca ttt cac agg att gag cta ctt Asn Ala Trp Ile Thr Val Ser Gln Ser Phe His Arg Ile Glu Leu Leu 145	150	155	480
aaa gat atg ata cgc caa ctt ctt ggc ccc agt tct ctg gat caa ctc Lys Asp Met Ile Arg Gln Leu Leu Gly Pro Ser Ser Leu Asp Gln Leu 165	170	175	528
ttg caa gaa ttg caa ggg aag gtg gtg caa gta cat cat ctt tct Leu Gln Glu Leu Gln Gly Lys Val Val Gln Val His His Leu Ser 180	185	190	576
gag tac ctg ata gaa gag ctc aag gag aag agg tac ttt gtt gtt cta Glu Tyr Leu Ile Glu Glu Leu Lys Glu Lys Arg Tyr Phe Val Val Leu 195	200	205	624
gat gat cta tgg att tta cat gat tgg aat tgg ata aat gaa att gca Asp Asp Leu Trp Ile Leu His Asp Trp Asn Trp Ile Asn Glu Ile Ala 210	215	220	672
ttt cct aag aac aat aag aag ggc agt caa ata gta ata acc act tgg Phe Pro Lys Asn Asn Lys Lys Gly Ser Gln Ile Val Ile Thr Thr Trp 225	230	235	720
aat gtt gat ctt gcg gag aag tgt gcc aca gcc tca ctg gtg tac cac Asn Val Asp Leu Ala Glu Lys Cys Ala Thr Ala Ser Leu Val Tyr His 245	250	255	768
ctt gat ttc ttg cag atg aac gat gcc ata aca ttg cta ctg aga aaa Leu Asp Phe Leu Gln Met Asn Asp Ala Ile Thr Leu Leu Leu Arg Lys 260	265	270	816
aca aat aaa aat cat gaa gac atg gaa tca aat aaa aat atg caa aag Thr Asn Lys Asn His Glu Asp Met Glu Ser Asn Lys Asn Met Gln Lys 275	280	285	864
atg gtt gaa cga att gta aat aaa tgt ggt cgt cta cca tta gca ata Met Val Glu Arg Ile Val Asn Lys Cys Gly Arg Leu Pro Leu Ala Ile 290	295	300	912
ctt aca ata gga gct gtg ctt gca act aaa cag gtg tca gaa tgg gag Leu Thr Ile Gly Ala Val Leu Ala Thr Lys Gln Val Ser Glu Trp Glu 305	310	315	960
aaa ttc tat gaa cac ctt cct tca gaa ata aac cca agc ctg Lys Phe Tyr Glu His Leu Pro Ser Glu Leu Glu Ile Asn Pro Ser Leu 325	330	335	1008
gaa gct ttg agg aga atg gtg acc cta ggt tac aac cac cta cca tcc			1056

Glu Ala Leu Arg Arg Met Val Thr Leu Gly Tyr Asn His Leu Pro Ser			
340	345	350	
cat ctg aaa cca tgc ttt ttg tat cta agt atc ttt cct gag gat ttt			1104
His Leu Lys Pro Cys Phe Leu Tyr Leu Ser Ile Phe Pro Glu Asp Phe			
355	360	365	
gaa atc aaa agg aat cgt cta gta ggt aga tgg ata gca gaa ggg ttt			1152
Glu Ile Lys Arg Asn Arg Leu Val Gly Arg Trp Ile Ala Glu Gly Phe			
370	375	380	
gtt aga cca aag gtt ggg atg acg act aag gat gtc gga gaa agt tac			1200
Val Arg Pro Lys Val Gly Met Thr Thr Lys Asp Val Gly Glu Ser Tyr			
385	390	395	400
ttt aat gag cta atc aac cga agt atg att caa cga tca aga gtg ggc			1248
Phe Asn Glu Leu Ile Asn Arg Ser Met Ile Gln Arg Ser Arg Val Gly			
405	410	415	
ata gca gga aaa att aag act tgt cga att cat gat atc atc cgt gat			1296
Ile Ala Gly Lys Ile Lys Thr Cys Arg Ile His Asp Ile Ile Arg Asp			
420	425	430	
atc aca gtt tca atc tcg aga cag gaa aat ttt gta ttg tta cca atg			1344
Ile Thr Val Ser Ile Ser Arg Gln Glu Asn Phe Val Leu Leu Pro Met			
435	440	445	
gga gat ggc tct gat tta gtt cag gaa aac act cgc cac ata gca ttc			1392
Gly Asp Gly Ser Asp Leu Val Gln Glu Asn Thr Arg His Ile Ala Phe			
450	455	460	
cat ggg agt atg tcc tcg aaa aca gga ttg gat tgg agc att att cga			1440
His Gly Ser Met Ser Cys Lys Thr Gly Leu Asp Trp Ser Ile Ile Arg			
465	470	475	480
tca tta gct att ttt ggt gac aga ccc aag agt cta gca cat gca gtt			1488
Ser Leu Ala Ile Phe Gly Asp Arg Pro Lys Ser Leu Ala His Ala Val			
485	490	495	
tgt cca gat caa ttg agg atg tta cgg gtc ttg gat ctt gaa gat gtg			1536
Cys Pro Asp Gln Leu Arg Met Leu Arg Val Leu Asp Leu Glu Asp Val			
500	505	510	
aca ttc tta atc act caa aaa gat ttc gac cgt att gca ttg ttg tgc			1584
Thr Phe Leu Ile Thr Gln Lys Asp Phe Asp Arg Ile Ala Leu Leu Cys			
515	520	525	
cac ttg aaa tac ttg agt att gga tat tcg tca tcc ata tat tca ctt			1632
His Leu Lys Tyr Leu Ser Ile Gly Tyr Ser Ser Ser Ile Tyr Ser Leu			
530	535	540	
ccc aga tcc att ggt aaa cta cag ggc cta caa act ttg aac atg ccg			1680
Pro Arg Ser Ile Gly Lys Leu Gln Gly Leu Gln Thr Leu Asn Met Pro			
545	550	555	560
agc aca tac att gca gca cta cca agt gag atc agt aaa ctc caa tgt			1728
Ser Thr Tyr Ile Ala Ala Leu Pro Ser Glu Ile Ser Lys Leu Gln Cys			
565	570	575	
ctg cat act ctt cgt tgt agt aga aag ttt gtt tct gac aac ttt agt			1776
Leu His Thr Leu Arg Cys Ser Arg Lys Phe Val Ser Asp Asn Phe Ser			
580	585	590	

cta aac cac cca atg aag tgc ata act aac aca ata tgc ctg cct aaa Leu Asn His Pro Met Lys Cys Ile Thr Asn Thr Ile Cys Leu Pro Lys	595	600	605	1824
gta ttc aca cct tta gtt agt cgc gat gat cgt gca ata caa att gct Val Phe Thr Pro Leu Val Ser Arg Asp Asp Arg Ala Ile Gln Ile Ala	610	615	620	1872
gaa ttg cac atg gcc acc aaa agt tgc tgg tat aaa tca ttc ggt gtg Glu Leu His Met Ala Thr Lys Ser Cys Trp Tyr Lys Ser Phe Gly Val	625	630	635	1920
aag gta ccc aaa gga ata ggt aag ttg cga gac tta cag gtt cta gag Lys Val Pro Lys Gly Ile Gly Lys Leu Arg Asp Leu Gln Val Leu Glu	645	650	655	1968
tat gta gat atc agg cgg acc agt agt aga gca atc aaa gag ctg ggg Tyr Val Asp Ile Arg Arg Thr Ser Ser Arg Ala Ile Lys Glu Leu Gly	660	665	670	2016
cag tta agc aag ctg agg aaa tta ggt gtg atg aca aat ggc tcg aca Gln Leu Ser Lys Leu Arg Lys Leu Gly Val Met Thr Asn Gly Ser Thr	675	680	685	2064
aag gaa aaa tgt aag ata ctt tgt gca gcc att gag aag ctc tct tcc Lys Glu Lys Cys Lys Ile Leu Cys Ala Ala Ile Glu Lys Leu Ser Ser	690	695	700	2112
ctc caa tat ctc tat gtg aat gct gca gga atc tca gat ggt gga aca Leu Gln Tyr Leu Tyr Val Asn Ala Ala Gly Ile Ser Asp Gly Gly Thr	705	710	715	720
ctt gag tgc cta gat tct att tcc tct cct ccc cta ctg agg aca Leu Glu Cys Leu Asp Ser Ile Ser Ser Pro Pro Pro Leu Leu Arg Thr	725	730	735	2208
ctc gtg ttg tat gga agt ctt gaa gag atg cct aac tgg att gag cag Leu Val Leu Tyr Gly Ser Leu Glu Glu Met Pro Asn Trp Ile Glu Gln	740	745	750	2256
ctc act cac ctg aag aag atc tac tta ttg agg agc aaa cta aag gaa Leu Thr His Leu Lys Ile Tyr Leu Leu Arg Ser Lys Leu Lys Glu	755	760	765	2304
ggt aaa acc atg ctg ata ctt ggg gca ttg ccc aac ctc atg gtc ctt Gly Lys Thr Met Leu Ile Leu Gly Ala Leu Pro Asn Leu Met Val Leu	770	775	780	2352
gat ctt tat cgg aaa gct tac ctt ggg gag aag cta gta ttc aaa aca Asp Leu Tyr Arg Lys Ala Tyr Leu Gly Glu Lys Leu Val Phe Lys Thr	785	790	795	800
gga gca ttc cca aat ctt aga aca ctt tcg att tac gat ttg gat cag Gly Ala Phe Pro Asn Leu Arg Thr Leu Ser Ile Tyr Asp Leu Asp Gln	805	810	815	2448
cta aga gag att aga ttt gag gac ggc agc tcg ccc cag ttg gaa aag Leu Arg Glu Ile Arg Phe Glu Asp Gly Ser Ser Pro Gln Leu Glu Lys	820	825	830	2496
ata gaa atc aga ttc tgc agg ttg gaa tca ggg att att ggt att atc Ile Glu Ile Arg Phe Cys Arg Leu Glu Ser Gly Ile Ile Gly Ile Ile	835	840	845	2544

cac ctt cca agg ctc aag gag att tca ctt gga tac gaa agt aaa gtg His Leu Pro Arg Leu Lys Glu Ile Ser Leu Gly Tyr Glu Ser Lys Val 850 855 860	2592
gct ggg ctt gct cag ctg gag gga gaa gtg cgc aca cac cca aat cac Ala Gly Leu Ala Gln Leu Glu Gly Glu Val Arg Thr His Pro Asn His 865 870 875 880	2640
ccc gtg ctg cga aag agg gag gac cga agt gat cac gac ctt gct tgt Pro Val Leu Arg Lys Arg Glu Asp Arg Ser Asp His Asp Leu Ala Cys 885 890 895	2688
gac gcc gaa gga tcc cct gtt gaa gtg gaa gca acg gat ccc ctc cca Asp Ala Glu Gly Ser Pro Val Glu Val Glu Ala Thr Asp Pro Leu Pro 900 905 910	2736
gag cag gag gga gag agc tcg cag cga aga gat aag cac agc tca agc Glu Gln Glu Gly Glu Ser Ser Gln Arg Arg Asp Lys His Ser Ser Ser 915 920 925	2784
tgg ttt tat caa gtg atg atc tcc tcc tcc att ggc atc tcc ggt cgt Trp Phe Tyr Gln Val Met Ile Ser Ser Ser Ile Gly Ile Ser Gly Arg 930 935 940	2832
ccc tgc ttc tgc ggc tgc gca cac ctc gct gtt ccg agg agg ggt gct Pro Cys Phe Cys Gly Cys Ala His Leu Ala Val Pro Arg Arg Gly Ala 945 950 955 960	2880
gat cta agg agg ctt cca ctt tct tca att gcg tct cac gct ctc gat Asp Leu Arg Arg Leu Pro Leu Ser Ser Ile Ala Ser His Ala Leu Asp 965 970 975	2928
tct tcc ctc tcg ggt atg aat tgt ttc aat ctg acc ttt tct cgt gat Ser Ser Leu Ser Gly Met Asn Cys Phe Asn Leu Thr Phe Ser Arg Asp 980 985 990	2976
atg cta ctg gtt cca gca tga Met Leu Leu Val Pro Ala * 995	2997

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Gly Val Glu Lys Asp Ile Trp Tyr Leu Phe Arg His Gly Val Gly Arg
35 40 45
Ser Asn Gly Gly Pro Val Val Gly Met Val Ala Ser Gly Asn Gln Ser
50 55 60
Cys Leu Ala Ile Asp Ser Tyr Ala Glu Asp Ile Arg Asn Gln Ser Ala
65 70 75 80
Arg Asn Val Asp Glu Ala Glu Leu Val Gly Phe Ser Asp Ser Lys Lys
85 90 95
Arg Leu Leu Glu Met Ile Asp Thr Asn Ala Asn Asp Gly Pro Ala Lys
100 105 110
Val Ile Cys Val Val Gly Met Gly Gly Leu Gly Lys Thr Ala Leu Ser

115	120	125
Arg Lys Ile Phe Glu Ser Glu Glu Asp Ile Arg Lys Asn Phe Pro Cys		
130	135	140
Asn Ala Trp Ile Thr Val Ser Gln Ser Phe His Arg Ile Glu Leu Leu		
145	150	155
Lys Asp Met Ile Arg Gln Leu Leu Gly Pro Ser Ser Leu Asp Gln Leu		160
165	170	175
Leu Gln Glu Leu Gln Gly Lys Val Val Gln Val His His Leu Ser		
180	185	190
Glu Tyr Leu Ile Glu Glu Leu Lys Glu Lys Arg Tyr Phe Val Val Leu		
195	200	205
Asp Asp Leu Trp Ile Leu His Asp Trp Asn Trp Ile Asn Glu Ile Ala		
210	215	220
Phe Pro Lys Asn Asn Lys Lys Gly Ser Gln Ile Val Ile Thr Thr Trp		
225	230	235
Asn Val Asp Leu Ala Glu Lys Cys Ala Thr Ala Ser Leu Val Tyr His		240
245	250	255
Leu Asp Phe Leu Gln Met Asn Asp Ala Ile Thr Leu Leu Leu Arg Lys		
260	265	270
Thr Asn Lys Asn His Glu Asp Met Glu Ser Asn Lys Asn Met Gln Lys		
275	280	285
Met Val Glu Arg Ile Val Asn Lys Cys Gly Arg Leu Pro Leu Ala Ile		
290	295	300
Leu Thr Ile Gly Ala Val Leu Ala Thr Lys Gln Val Ser Glu Trp Glu		
305	310	315
Lys Phe Tyr Glu His Leu Pro Ser Glu Leu Glu Ile Asn Pro Ser Leu		320
325	330	335
Glu Ala Leu Arg Arg Met Val Thr Leu Gly Tyr Asn His Leu Pro Ser		
340	345	350
His Leu Lys Pro Cys Phe Leu Tyr Leu Ser Ile Phe Pro Glu Asp Phe		
355	360	365
Glu Ile Lys Arg Asn Arg Leu Val Gly Arg Trp Ile Ala Glu Gly Phe		
370	375	380
Val Arg Pro Lys Val Gly Met Thr Thr Lys Asp Val Gly Glu Ser Tyr		
385	390	395
Phe Asn Glu Leu Ile Asn Arg Ser Met Ile Gln Arg Ser Arg Val Gly		400
405	410	415
Ile Ala Gly Lys Ile Lys Thr Cys Arg Ile His Asp Ile Ile Arg Asp		
420	425	430
Ile Thr Val Ser Ile Ser Arg Gln Glu Asn Phe Val Leu Leu Pro Met		
435	440	445
Gly Asp Gly Ser Asp Leu Val Gln Glu Asn Thr Arg His Ile Ala Phe		
450	455	460
His Gly Ser Met Ser Cys Lys Thr Gly Leu Asp Trp Ser Ile Ile Arg		
465	470	475
Ser Leu Ala Ile Phe Gly Asp Arg Pro Lys Ser Leu Ala His Ala Val		480
485	490	495
Cys Pro Asp Gln Leu Arg Met Leu Arg Val Leu Asp Leu Glu Asp Val		
500	505	510
Thr Phe Leu Ile Thr Gln Lys Asp Phe Asp Arg Ile Ala Leu Leu Cys		
515	520	525
His Leu Lys Tyr Leu Ser Ile Gly Tyr Ser Ser Ser Ile Tyr Ser Leu		
530	535	540
Pro Arg Ser Ile Gly Lys Leu Gln Gly Leu Gln Thr Leu Asn Met Pro		
545	550	555
Ser Thr Tyr Ile Ala Ala Leu Pro Ser Glu Ile Ser Lys Leu Gln Cys		560
565	570	575
Leu His Thr Leu Arg Cys Ser Arg Lys Phe Val Ser Asp Asn Phe Ser		
580	585	590
Leu Asn His Pro Met Lys Cys Ile Thr Asn Thr Ile Cys Leu Pro Lys		
595	600	605
Val Phe Thr Pro Leu Val Ser Arg Asp Asp Arg Ala Ile Gln Ile Ala		
610	615	620

Glu Leu His Met Ala Thr Lys Ser Cys Trp Tyr Lys Ser Phe Gly Val
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 Lys Val Pro Lys Gly Ile Gly Lys Leu Arg Asp Leu Gln Val Leu Glu
 645 650 655
 Tyr Val Asp Ile Arg Arg Thr Ser Ser Arg Ala Ile Lys Glu Leu Gly
 660 665 670
 Gln Leu Ser Lys Leu Arg Lys Leu Gly Val Met Thr Asn Gly Ser Thr
 675 680 685
 Lys Glu Lys Cys Lys Ile Leu Cys Ala Ala Ile Glu Lys Leu Ser Ser
 690 695 700
 Leu Gln Tyr Leu Tyr Val Asn Ala Ala Gly Ile Ser Asp Gly Gly Thr
 705 710 715 720
 Leu Glu Cys Leu Asp Ser Ile Ser Ser Pro Pro Pro Leu Leu Arg Thr
 725 730 735
 Leu Val Leu Tyr Gly Ser Leu Glu Glu Met Pro Asn Trp Ile Glu Gln
 740 745 750
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 755 760 765
 Gly Lys Thr Met Leu Ile Leu Gly Ala Leu Pro Asn Leu Met Val Leu
 770 775 780
 Asp Leu Tyr Arg Lys Ala Tyr Leu Gly Glu Lys Leu Val Phe Lys Thr
 785 790 795 800
 Gly Ala Phe Pro Asn Leu Arg Thr Leu Ser Ile Tyr Asp Leu Asp Gln
 805 810 815
 Leu Arg Glu Ile Arg Phe Glu Asp Gly Ser Ser Pro Gln Leu Glu Lys
 820 825 830
 Ile Glu Ile Arg Phe Cys Arg Leu Glu Ser Gly Ile Ile Gly Ile Ile
 835 840 845
 His Leu Pro Arg Leu Lys Glu Ile Ser Leu Gly Tyr Glu Ser Lys Val
 850 855 860
 Ala Gly Leu Ala Gln Leu Glu Gly Glu Val Arg Thr His Pro Asn His
 865 870 875 880
 Pro Val Leu Arg Lys Arg Glu Asp Arg Ser Asp His Asp Leu Ala Cys
 885 890 895
 Asp Ala Glu Gly Ser Pro Val Glu Val Glu Ala Thr Asp Pro Leu Pro
 900 905 910
 Glu Gln Glu Gly Glu Ser Ser Gln Arg Arg Asp Lys His Ser Ser Ser
 915 920 925
 Trp Phe Tyr Gln Val Met Ile Ser Ser Ser Ile Gly Ile Ser Gly Arg
 930 935 940
 Pro Cys Phe Cys Gly Cys Ala His Leu Ala Val Pro Arg Arg Gly Ala
 945 950 955 960
 Asp Leu Arg Arg Leu Pro Leu Ser Ser Ile Ala Ser His Ala Leu Asp
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